ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

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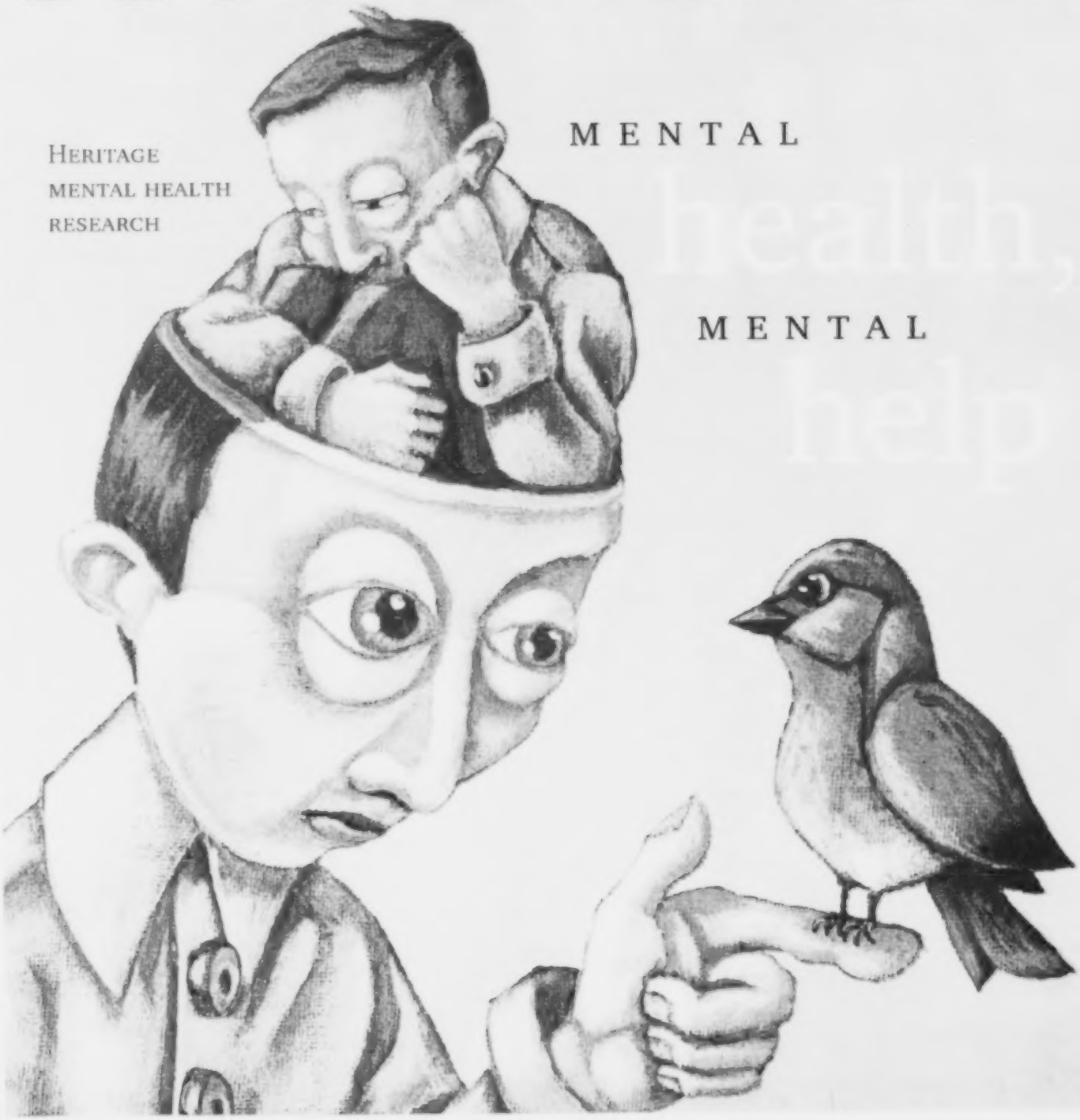
FALL 2003

research news

HERITAGE
MENTAL HEALTH
RESEARCH

MENTAL health, MENTAL help



On the Cover

Graham Johnson is an Edmonton illustrator and graphic designer. He graduated in May 2003 from the Visual Communication Design program at Grant MacEwan College with a specialization in Design and Illustration. His work was recently featured in the 2003 Applied Arts magazine Photography and Illustration Annual. The cover art is acrylic on canvas.

AHFMR Mission

AHFMR supports a community of researchers who generate knowledge whose application improves the health and quality of life of Albertans and people throughout the world. AHFMR's long-term commitment is to fund health research based on international standards of excellence and carried out by new and established investigators and researchers in training.

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Managing editor: Janet Harvey
Writers: Connie Bryson, Suntanu Dalal, Janet Harvey, Barbara Kermode Scott, Mark Lowey
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Cover illustration and feature story illustrations: Graham Johnson
Inside illustrations: Cindy Revell
Photography: Trudie Lee, Brian Harder, Calgary; Roth and Ramberg, Edmonton; Getty Images

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AHFMR Research News is printed by Speedfast Color Press Inc. on 70lb Luna Matte text.

ISSN 1700-6236 (print) ISSN 1703-5694 (online)

Canadian Publications Agreement #40064910

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The distribution of health and well-being is all tied up with how we function as a society according to Dr. Penny Hawe.

Dr. Zhixiang Wang is doing groundbreaking research that may one day help medical researchers better understand breast cancer.

Mental disorders are very common and often go untreated. Heritage mental health researchers are working to make a difference for those who suffer from these devastating illnesses.

Dr. Moloney is an expert in plant genetic engineering, while Heritage Scientist Dr. Schryvers looks for new ways to design vaccines. Normally their paths wouldn't cross at the University of Calgary.

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A busy research lab is a bit like a well-organized restaurant kitchen. It is abuzz with activity, and with good timing and a bit of luck, the recipes are assembled smoothly and the end product is a pleasure to experience. Maybe some new recipes are even concocted, with surprising results.

Dr. Richard Cammack has spent the last year designing his own "recipes". Of course there's no gastronomic theme to the work of this internationally known biochemistry researcher and editor-in-chief of the Oxford Dictionary of Biochemistry and Molecular Biology. Rather, his recipes are experiments aimed at understanding how iron-sulfur proteins work in our cells. For the past year, Dr. Cammack has been doing this research in two labs, at the University of Georgia and the University of Alberta, where he has spent his sabbatical from King's College London.

"What I've enjoyed most about the past year is the freedom," he says. "If I see a problem of interest, I can run with it—do the experiments and get the results. In my normal university environment, with so many other pressures from teaching and administrative responsibilities, there's precious little time to see things through."

And see things through he has. At the University of Alberta, Dr. Cammack spent six months as an AHFMR Visiting Scientist in Dr. Joel Weiner's lab in the biochemistry department. Working closely with Dr. Richard Rothery, the senior researcher on Dr. Weiner's team, Dr. Cammack discovered two new iron-sulfur protein clusters in one day, a breakthrough that he calls the highlight of his sabbatical. A number of scientific papers are expected to flow from this discovery.

Iron-sulfur proteins play key roles in our cells, regulating metabolism, electron transport, and gene expression. Dr. Cammack has pioneered a method of piecing together how the various parts of these proteins work. It's called EPR (electron paramagnetic resonance) spectroscopy and is used to study biological molecules by looking at what their electrons are doing.

"Dick Cammack is one of the 'fathers' of EPR spectroscopy," says Dr. Weiner, who has collaborated with Dr. Cammack for more than 20 years. "When we got our first spectrometer years ago, he came over and helped us set it up. Now we have new, state-of-the-art equipment.

"The advantage of having Dick here for six months is that we could tap into his enormous knowledge and experience. We bounced ideas off each other and made serious inroads into some fundamental questions about the assembly, structure, and function of proteins.

"What I've enjoyed most about the past year is the freedom."

"It's so different from a short visit where we discuss things and usually end up saying, 'That's a good idea. Maybe we can get someone to do it.' In this situation, Dick actually did it. It's been a wonderful six months."

The AHFMR Visiting Scientist program provides funding to bring scientists from around the world with expertise not readily available at the sponsoring Alberta institution. AHFMR has provided funding for 92 visiting scientists since the inception of the program.

ABOVE: DR. RICHARD CAMMACK

The healthy community

It's hard for people to be healthy in an unhealthy environment or community. Even though health professionals can treat specific diseases and emphasize ways to keep healthy, it's now time to attend to the health of the communities where people come together to learn, work, and socialize, according to Heritage Senior Scholar Dr. Penny Hawe.

There's no question that medical interventions and advances that address specific risk behaviors, treat diseases, and save lives have improved health and quality of life. "But the distribution of health and well-being is all tied up with how we function as a society," says Dr. Hawe. "In society as a whole, large and long-term changes in the health of the population are more likely to come from health-sensitive planning in a range of sectors, and from investments in education, social infrastructure, and employment."

Recruited from Australia with AHFMR funding, Dr. Hawe and research collaborators at the University of Calgary (including health economist Dr. Alan Shiell and social geographer Dr. Jim Dunn, both Heritage researchers) are investigating ways to improve quality of life and well-being in the school, the workplace, the neighborhood, and the extended community.

One of the big challenges with such community-level interventions is showing that they actually have health benefits. A surgeon who performs bypass surgery to open blocked arteries in a patient's heart can readily produce scientific evidence that the procedure improved heart function. But how easily can a health-promotion researcher show that a community-level intervention made an entire school healthier?

AHFMR is funding a two-year research pilot project that will enable Dr. Hawe and colleagues, Dr. Laura Ghali at the University of Calgary and Dr. Judith Kulig at the University of Lethbridge, to gather some high-quality evidence. They are working with students and teachers in a high school in rural southern Alberta, as well as with the local community. The project focuses on activities and policies that encourage members of the school community to feel safe, connected, and valued. Benefits could include reducing students' health-risk behaviors, such as smoking, alcohol consumption, and drug use. Another hoped-for benefit is the development of programs in the school and the local community to address future health issues.

If results from the pilot project are promising, Dr. Hawe and colleagues plan to apply for funding to conduct a large, randomized trial of the intervention in about 40 schools across Alberta. "I want to be able to provide the right quality evidence so that the policy makers can allocate funding in this area in good conscience, rather than in good faith," says Dr. Hawe.

One of the big challenges with community-level interventions is showing that they have health benefits.

Heritage Senior Scholar Dr. Penelope Hawe is a full professor in the University of Calgary's Department of Community Health Sciences, as well as the Markin Chair in Health Promotion. She receives additional funding from the Alberta Alcohol and Drug Abuse Commission (AADAC); the Canadian Institutes of Health Research (CIHR); the Canadian Population Health Initiative; and the Social Sciences and Humanities Research Council (SSHRC).

Selected publications

Rychetnik L, Frommer M, Hawe P, Shiell A. Criteria for evaluating evidence on public health interventions. *Journal of Epidemiology and Community Health* 2002 Feb;56(2):119-127.

Hawe P, Shiell A. Social capital and health promotion: a review. *Social Science and Medicine* 2000 Sep 15;51(6):871-885.

Hawe P. Capturing the meaning of 'community' in community intervention evaluation: some contributions from community psychology. *Health Promotion International* 1994;9(3):199-210.

LEFT: DR. PENELOPE HAWE

The more scientists learn about the genetic blueprint for people, the more they're puzzled about why so much of the human genome consists of what looks like junk. "Junk DNA"—so-called because it has no obvious function—makes up more than 95% of the human genome, the chromosomes that contain all of our genes and associated DNA. Heritage Senior Scholar Dr. Steven Zimmerly is investigating the origin, evolution, and possible functions of junk DNA.

Junk DNA

DNA, the deoxyribonucleic acid molecules inside cells, carries genetic information and passes it from one generation to the next. It is a crucial 1% of our genome that carries the DNA code that cells need to replicate and produce proteins. Without these genes, we wouldn't survive.

Dr. Zimmerly's research focuses on "group II introns"

Interspersed with the protein-producing gene sequences, however, are huge amounts of two types of junk DNA, called introns and retroelements. In order to produce useful proteins, introns must be spliced out of the gene sequence as the DNA code is transcribed into RNA (ribonucleic acid) and then translated to form various proteins. Retroelements, the other type of junk DNA, are also called "mobile DNA". Like viruses, retroelements can replicate within a cell and insert themselves into new locations, causing the DNA to move around and change. Retroelements are also called "selfish DNA" because they propagate in their host, although they don't infect cells like viruses do.

"One of the puzzles is, why is there so much of the junk DNA compared with the useful DNA?" says Dr. Zimmerly. "A lot of people—myself included—think that it's not really junk. But we don't yet understand how it's useful, if it does have a function."

Dr. Zimmerly's research focuses on "group II introns", which are unusual because they have both the self-splicing property of introns and the mobility of retroelements. Dr. Zimmerly theorizes that group II introns originated in bacteria, then evolved into the more complex cells of higher life forms called eukaryotes, which includes plants, animals, and people. Over time, he thinks, the primitive form of the element spread through the eukaryotic genome, differentiating into introns and retroelements.

"We're interested in defining the introns, the spread of the introns, and the patterns for their distribution in bacteria," he says. "Our work will help scientists understand the function of genomes in general, the roles of selfish DNAs and junk DNAs, and the dynamics of how they spread over time and how they might take on useful functions."

The research could also help other scientists who are exploring ways to use introns in gene therapy as a mechanism to insert DNA sequences at specific locations in the gene to repair genetic defects.

"Time and time again in scientific history, a lot of the really big breakthroughs come from people who aren't directly looking for medical applications," Dr. Zimmerly notes.

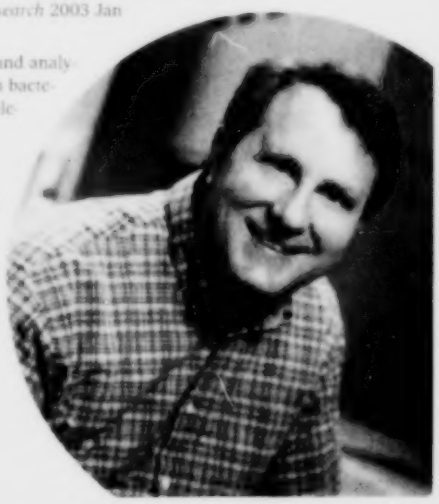
Dr. Steven Zimmerly is a Heritage Senior Scholar and an associate professor in the University of Calgary's Department of Biological Sciences in the Faculty of Sciences. He also receives funding from the CIHR (Canadian Institutes of Health Research) and NSERC (the Natural Sciences and Engineering Research Council of Canada).

Selected publications

Dai L, Toor N, Olson R, Keeping A, Zimmerly S. Database for mobile group II introns. *Nucleic Acids Research* 2003 Jan 1;31(1):424-426.

Dai L, Zimmerly S. Compilation and analysis of group II intron insertions in bacterial genomes: evidence for retroelement behavior. *Nucleic Acids Research* 2002 Mar 1;30(5):1091-1102.

Dai L, Zimmerly S. The dispersal of five group II introns among natural populations of *Escherichia coli*. *RNA* 2002 Oct;8(10):1294-1307.



RIGHT: DR. STEVEN ZIMMERLY

AIDS, infections and the immune system

When you're healthy, your immune system works hard to defend you against infection and keep you well. But if your immune system becomes compromised, your body's defenses are weakened. You're much more vulnerable to infection.

Calgary physician and AHFMR Senior Scholar Dr. Christopher Mody treats patients with acute and chronic infections of the lung, patients with immune system diseases, and patients who have developed lung problems following bone marrow transplants. A specialist in respirology, he is also researching new ways to kill infections. Currently, he and his lab staff are working on a way to kill a fungus called *Cryptococcus neoformans*. This fungus is a yeast found in soil contaminated with pigeon droppings, in eucalyptus trees, and in decaying wood that forms hollows in living trees. The fungus is responsible for a number of life-threatening and fatal infections.

"Fungal organisms are very difficult for the immune system to kill," explains Dr. Mody. "When patients have defects in their immunity they are often very severely compromised, especially to the devastating consequences of fungal infections. What we're working on is a previously unidentified mechanism by which the immune system kills these organisms. It also looks like this mechanism could be applied to a wide variety of different infections."

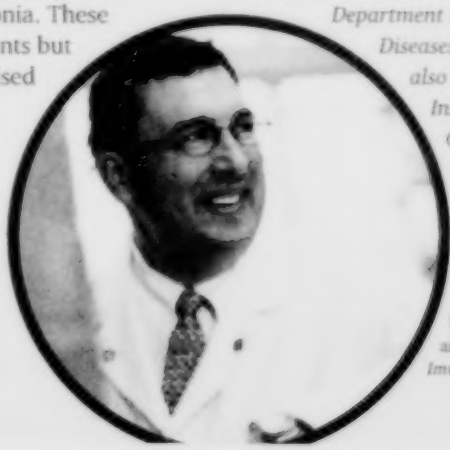
"Fungal organisms are very difficult for the immune system to kill."

The *Cryptococcus neoformans* family causes infections such as meningitis and pneumonia. These infections occur mostly in AIDS patients but can also affect others with compromised immune systems, including organ transplant recipients and cancer patients. In the Western world, the new drugs for HIV/AIDS patients, known as "highly active antiretroviral therapies", help to restore immunity and protect AIDS patients against this fungus. In the developing world, however, HIV-infected individuals often cannot afford these drugs and an overwhelming number of AIDS patients are affected by these kinds of infections.

"Cryptococcus is still a devastating problem in Thailand and in Africa," explains Dr. Mody. "There have been no major advances in therapy for these organisms for such a long time. We desperately need new therapies for fungal infections."

A recent outbreak of cryptococcosis on Vancouver Island caused over 90 cases and several deaths. This outbreak was caused by a sister organism to the fungus that Dr. Mody and his colleagues are studying in AIDS patients and patients with immunological diseases. Their lab is now also investigating how to battle this organism, looking at the role of a killer molecule called granulysin and the ways in which the body uses it to fight fungal infections. The task is certainly challenging, but they're making significant progress and are already making new discoveries. If the research ultimately leads to new medications for fungal infections, their work could save many lives and improve the quality of life for many more individuals.

Dr. Mody suggests that an essential part of medical research is the research that occurs in university centres and involves interaction between lab scientists and clinician-scientists. "I really think that the important advances that are going to help us over the next little while are going to come from those kinds of interactions, those kinds of collaborations, and that kind of work," he says.



RIGHT: DR. CHRISTOPHER MODY

Dr. Christopher Mody is a Heritage Senior Scholar and a full professor in the Department of Medicine and the Department of Microbiology and Infectious Diseases at the University of Calgary. He also receives funding from the Canadian Institutes of Health Research, the Canadian Cystic Fibrosis Foundation, the Alberta Lung Association and the Canadian Foundation for AIDS Research.

Selected publication

Ma LL, Mody CH. Granulysin and direct lymphocyte-mediated antimicrobial and antitumor activity. *Modern Aspects of Immunobiology* 2003. In press 2003.

Less than a decade ago Dr. Zhixiang Wang was studying bugs. Now, as an associate professor of cell biology at the University of Alberta, he is doing groundbreaking research that may one day help medical researchers better understand breast cancer.

The growth of breast cancer

Dr. Wang's change in research direction was spurred by seeing his mother fight and survive breast cancer and by a growing personal interest in doing basic scientific research that could have practical applications. "People need to find a way to cure cancer, and this kind of research looked more exciting," Dr. Wang explains. "That's why I decided to jump into medical-related research." He made the move from studying the cell biology of locusts to that of humans in 1994 while doing post-doctoral work at the University of Toronto.

Epidermal growth factor (EGF) is a protein found in most body fluids. At high levels, it can trigger the development of breast cancer. Dr. Wang has carved out a niche studying the mechanisms by which receptors on the membranes of human breast cancer cells stimulate cell growth in response to EGF.

Once EGF binds to a receptor on the outside of a cancer cell, it can immediately begin signalling to the cell nucleus to stimulate cell growth. This lasts just a few minutes, after which the receptor complex is then absorbed into the cell and destroyed by enzymes. Scientists have traditionally believed that the uptake of the receptor complex by the cell terminates the effects of EGF, but research has shown that the complex continues to generate cell growth signals for up to two hours inside the cell before it is destroyed.

Epidermal growth factor (EGF) is a protein found in most body fluids

Recently Dr. Wang's lab showed that EGF receptors don't even have to be activated outside the cell in order to produce signals once they are taken into the cell, and that this internal signaling alone can stimulate cell growth.

Dr. Wang says he came to the University of Alberta in 1999 because it was one of the best universities in Canada for medical research and had, in particular, a first-rate department of cell biology.

Research has been a family affair for Dr. Wang. Xinmei Chen, Dr. Wang's wife of 18 years, works as a technician in his laboratory, and they have authored a number of papers together.

Dr. Zhixiang Wang is a Heritage Scholar and an associate professor in the Department of Cell Biology in the Faculty of Medicine and Dentistry at the University of Alberta. He also receives funding from the CIHR (Canadian Institutes of Health Research) and NSERC (the Nati l Sciences and Engineering Research Council).

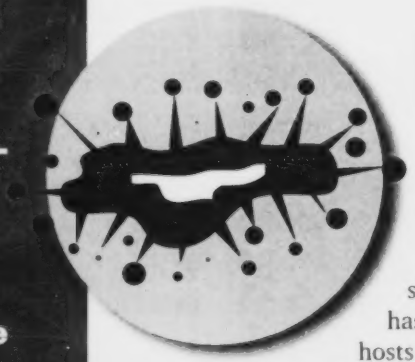
Selected publication

Pennock S, Wang Z. Stimulation of cell proliferation by endosomal EGFR as revealed through two distinct phases of signaling. *Molecular and Cellular Biology* 2003 Aug;23(16):5803-5315.

Proteins *in 3-D*

It sounds like some sort of Hollywood horror story:

the Thing lies in wait in hospitals—safe, clean environments where patients should feel secure while they recover from illness. It bides its time, waiting for a vulnerable moment ... and then it strikes, preying on the weak.



But we're not talking about some horrible monster or depraved killer from the movies. It's a bacteria called *Pseudomonas aeruginosa*, often found in clinical settings. It attacks those with weakened immune systems, causing a variety of infections, particularly in patients with severe burns, cancer, AIDS, and cystic fibrosis. An opportunistic bacteria, *P. aeruginosa* has a remarkable ability to cause disease in its hosts and thrive in a variety of environments.

Heritage Scholar Dr. Bart Hazes studies a protein (a chemical building block) of this devious bacteria. In the hospital setting *P. aeruginosa* exists in a number of different strains, all of which possess different forms of this particular protein. Yet all the strains seem capable of binding to the same host tissue receptor and causing infection. "We're trying to find out what is the same between all these different strains," says Dr. Hazes. That information could be used to make a vaccine which will block the protein from binding to the host and therefore protect against the disease. "The trick will be to get a vaccine that will cover all the different strains of the protein," he adds, pointing out that a candidate vaccine has already been prepared by Edmonton-based Cytovax Biotechnologies Inc., based on prior work by Dr. Hazes' collaborator Dr. Randy Irvin and others.

"The best way for the human brain to understand how something works is to actually see what's going on," says Dr. Hazes. "So we get a three-dimensional image of the atoms involved using protein crystallography." This technique uses intense x-ray beams to study crystals of proteins. The x-rays diffracting from the crystal are measured and then reassembled in the computer to produce an image. "If you shine x-rays on a single protein, the signal would be so weak you couldn't measure it," he explains. "The x-rays are also damaging, so your protein would

***P. aeruginosa* attacks those with weakened immune systems**

Alberta is very well set up for protein crystallography studies.

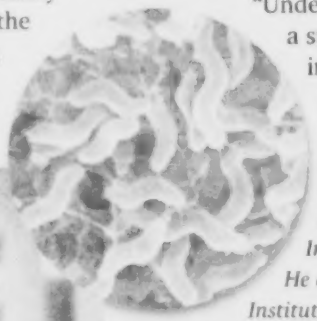
be blown to pieces before you could see anything. So we make crystals which contain billions of protein molecules arranged in a systematic manner. The light of each molecule gets reinforced by the others, giving enormous amplification." A further boost in signal is obtained by using instruments called synchrotrons which produce the cleanest and most intense x-ray beams.

Dr. Hazes points out that Alberta is very well set up for protein crystallography studies because of the Alberta Synchrotron Institute (ASI) and the Canadian Light Source (CLS), endeavors toward which AHFMR contributed $3 million. ASI coordinates access for Alberta scientists to foreign synchrotrons (such as the University of California at Berkeley, where Dr. Hazes currently takes his crystals) until Canada's first synchrotron, the Canadian Light Source, opens in Saskatoon in 2004. In the meantime, Dr. Hazes is busily preparing as many crystals as possible to make optimal use of the machine once the CLS is up and running. A new cutting-edge robot obtained with Canada Foundation for Innovation funding should help in this regard, requiring ten times less protein in order to make the crystals, as well as being easier and cheaper to use.

In addition to his *P. aeruginosa* studies, Dr. Hazes is also working on poxvirus proteins in collaboration with Heritage Scholar Dr. Michele Barry and Dr. David Wishart from the University of Alberta, and Dr. Chris Upton from the University of Victoria. The pox family of viruses causes smallpox and other related diseases. The team aims to find information about as many poxviral proteins as possible in order to use it for designing drugs. "If ever we need pharmaceuticals against smallpox or whatever other form of pox might rear its ugly head, we will have this body of knowledge," explains Dr. Hazes.

In a third project, Dr. Hazes is working with Dr. Laura Frost in the University of Alberta Department of Biological Sciences to assemble a picture of the process by which bacteria transfer DNA material from one cell to another, a process called conjugation. About 20 proteins are needed to form a "machine" in the outer membrane of the bacterium that accepts the DNA and pumps it into a neighboring bacterium.

"Many diseases originate from the function or the dysfunction of proteins," says Dr. Hazes. "Understanding how the proteins work at a structural level is an important step in developing new treatments for these illnesses."



LEFT: DR. BART HAZES

Dr. Bart Hazes is a Heritage Senior Scholar and an assistant professor in the Department of Medical Microbiology and Immunology at the University of Alberta. He also receives funding from the Canadian Institutes of Health Research (CIHR), the Canada Foundation for Innovation, and the Protein Engineering Network of Centres of Excellence (PENCE).

Selected publications

Audette GF, Irvin RT, Hazes B. Purification, crystallization and preliminary diffraction studies of the *Pseudomonas aeruginosa* strain K122-4 monomeric pilin. *Acta Crystallographica* 2003 Sep;D59(Pt.9):1665-1667.

Hazes B, Sastry PA, Hayakawa K, Read RJ, Irvin RT. Crystal structure of *Pseudomonas aeruginosa* PAK pilin suggests a main-chain-dominated mode of receptor binding. *Journal of Molecular Biology* 2000 Jun 16;299(4):1005-1017.

Hazes B, Read RJ. Accumulating evidence suggests that several AB-toxins subvert the endoplasmic reticulum-associated protein degradation pathway to enter target cells. *Biochemistry* 1997 Sep 16;36(37):11051-11054.

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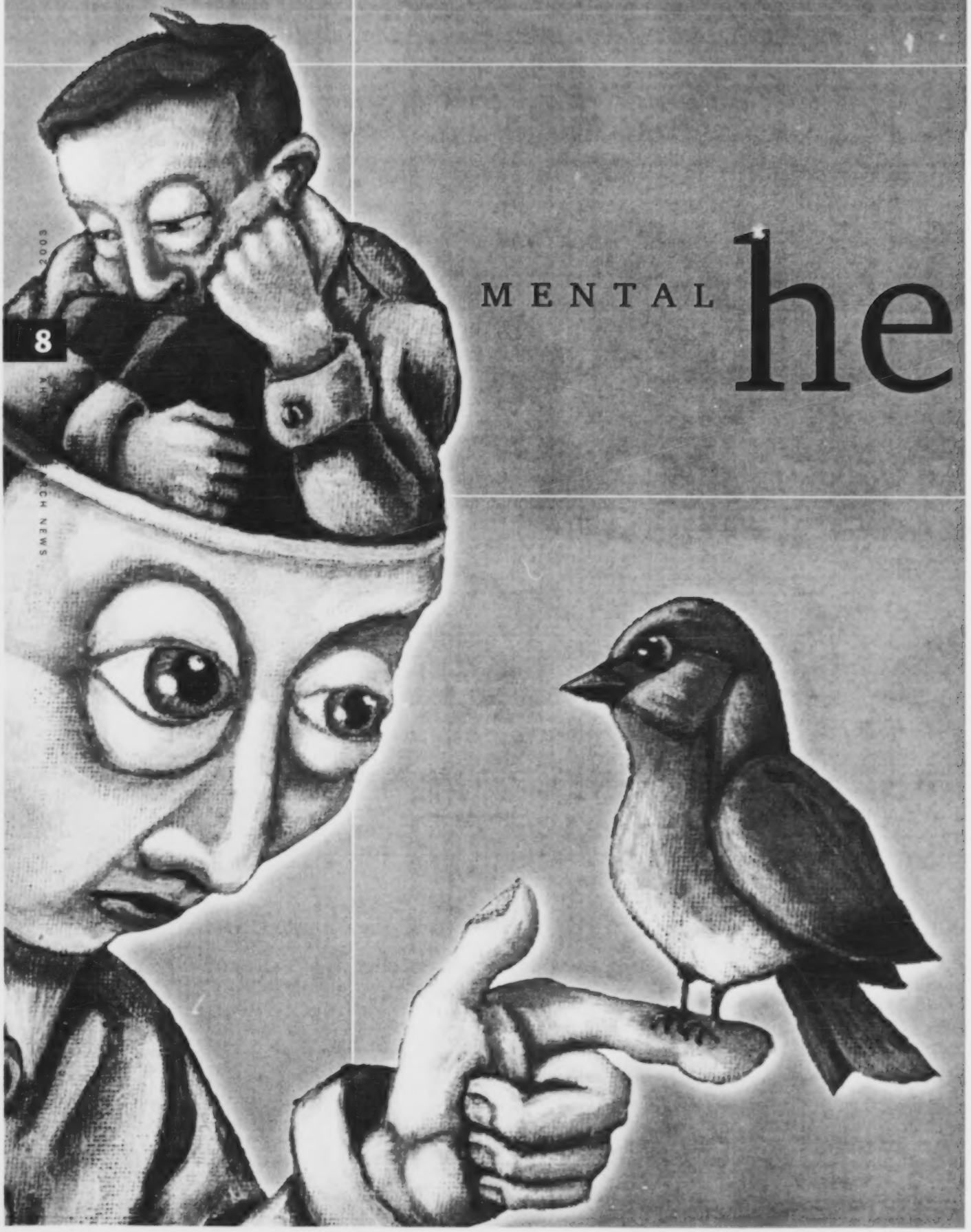

"Depression commonly untreated."

"Depression, addiction nearly as common as heart disease."

"Only one-third suffering depression seek help."

alth, MENTAL help

The headlines following the September 2003 release of a Statistics Canada survey of mental disorders all reflected the same sad news–that mental disorders are common, and many go untreated.

The Canadian survey confirmed what many already knew. According to the World Health Organization, 5 of the 10 leading causes of disability are related to mental disorders. It predicts that in less than 20 years, depression will be the second-leading cause of disability in the world. Health Canada estimates that in 1998, mental disorders were the third-highest source of direct healthcare costs at $4.7 billion.

Heritage Scholar Dr. Peter Silverstone, who is a practising psychiatrist in Edmonton, sees the burden on his patients every day. "Mental disorders are hugely disabling. They affect not only patients, but family, friends, and co-workers. We need answers to many questions about mental health.

"The 1990s were declared the 'Decade of the Brain' to kick-start a number of brain research programs. Since then we've come quite far on a number of different levels–genetics, molecular biology, treatments, drugs, risk factors–but there's still a long way to go. We are, after all, dealing with the brain, which is the most complex organ in the human body and also the least accessible. I think the important thing to understand, despite the gloomy statistics, is that progress is being made. Research is making a difference."

For example, Dr. Silverstone is using advanced biomedical imaging techniques to understand what goes on in the brains of people with bipolar disorder. Previously known as manic-depressive illness, this brain disorder causes dramatic mood swings, from overly "high" and/or irritable to sad and hopeless, then back again, often with periods of normal mood in between. Severe changes in energy and behavior go along with these changes in mood.

Dr. Silverstone's research relies on nuclear magnetic resonance (NMR) to look at changes in brain activity and certain chemicals in the brain, without surgery

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"NMR ALLOWS US TO PEER INTO THE BRAIN IN A MANNER THAT'S NEVER BEEN DONE BEFORE."

and without exposing patients to the ionizing radiation that comes from X-rays. The In Vivo NMR Centre at the University of Alberta is a state-of-the-art facility for this kind of research. "NMR allows us to peer into the brain in a manner that's never been done before," says Dr. Silverstone. "It is a key tool for my research, and for many other researchers from a wide range of disciplines. The NMR Centre puts Alberta in the forefront nationally and internationally."

In his work with bipolar disorder, Dr. Silverstone uses NMR to look at patients' brains before and after taking medication. "There are a number of different drugs that work well for people with bipolar disorder," he explains. "We have some ideas why they work, but we don't know for sure. NMR is helping us to zero in on the mechanism of action. This information will help in the design of better drugs and more effective treatment for people who suffer from this disabling illness."

Being able to zero in on mechanisms, as Dr. Silverstone wants to do, also requires detailed information on how information is routed through the brain. The brain's fundamental unit of communication is the synapse—the tiny gap between neurons (the cells in the brain) across which nerve impulses pass from one neuron to another. An impulse causes the release of a chemical neurotransmitter, which spreads across the gap and triggers an electrical impulse in the next neuron. The release and detection of neurotransmitters occurs at the synapse.

Heritage Scholar Dr. Janice Braun's research is focused on synaptic transmission. "Only 10 years ago we knew that synaptic transmission occurred, but we had no molecular information. We didn't know anything about the proteins involved," she says. But research over the past decade has changed all this. It is now known that neurotransmitter release is mediated by an elaborate sequence of events involving more than 80 distinct proteins. Almost all of these proteins have now been cloned and sequenced.

In a case of excellent career timing, Dr. Braun did her postdoctoral research just as this explosion in neuroscience information was happening. "It made a huge difference in the kind of work I can do. The analysis of synaptic proteins provided fundamental insight into the mechanisms of synaptic transmission and one of the most tangible advances in neurobiology over the last decade."

Dr. Braun's lab is known for its work on the role of molecular chaperones, proteins that regulate the shape and activities of proteins essential for synaptic transmission. Recent evidence points to changes in the activity of molecular chaperones in diseases that alter synaptic transmission. One of these diseases is schizophrenia, a mental disorder characterized by a cluster of symptoms that include delusions, hallucinations, apathy, and social withdrawal. "We can learn a lot about how proteins are supposed to function by studying diseases that alter their function," says Dr. Braun. "As we narrow things down, our work may be used to find new, more effective targets for drugs."

LEFT: DR. PETER SILVERSTONE
ABOVE: DR. JANICE BRAUN
RIGHT: DR. DONALD ADDINGTON

Schizophrenia is also the interest of Calgary psychiatrist Dr. Donald Addington. His research is aimed at minimizing the impact of this disabling and emotionally devastating illness. The average age of onset is 23, so schizophrenia most often strikes young people just as they are hitting their stride.

While there is no known cure for schizophrenia, it is a treatable disease. Most of those afflicted with schizophrenia respond to drug therapy, and many are able to lead productive and fulfilling lives. "The core issue in my research is ensuring optimal care for schizophrenia," says Dr. Addington.

One of his current projects involves developing performance measures (setting standards for effectiveness) for various types of treatments for schizophrenia. The measures have been identified, and Dr. Addington's team is now working to use them by making sure the necessary information can be collected in a routine and cost-effective way.

"The whole area of performance measures for treating mental disorders has been neglected," notes Dr. Addington. "A big problem is that people think it can't be done. I disagree. And there's no question that mental health performance measures are important. The leading cause of death in the Calgary Health Region for people aged 15 to 45 is suicide."

"THE CORE ISSUE IN MY RESEARCH IS ENSURING OPTIMAL CARE FOR SCHIZOPHRENIA."

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A Canadian mental health snapshot

In September 2003, Statistics Canada released new data on mental health and well-being from the Canadian Community Health Survey. The survey collected information from about 37,000 individuals, ages 15 and older, in all provinces. The highlights include:

- In the survey, 4% of people interviewed reported having experienced symptoms or feelings associated with major depression. That is, they actually met current diagnostic definitions for a major depressive episode in the past year. (This is similar to two other major health issues: 5% of Canadians have diabetes, and 5% have heart disease.) The University of Calgary's Dr. Scott Patten notes that a much larger number of people would have had symptoms associated with depression, but these would not be sufficiently severe or disabling to warrant the diagnosis.
- Youth aged 15–24 were most likely to suffer from selected mental disorders or substance-dependence problems.
- The majority of people suffering from selected mental disorders or substance dependence did not seek professional help.
- Teens and young adults were least likely to use mental health resources, despite the higher prevalence of mental health problems in this age group.
- One out of 5 people suffering from a mental disorder or substance dependence reported a perceived unmet need for help.
- The vast majority of people interviewed were satisfied with the help they received for mental health problems.
- Women reported more disability days due to mental disorders.

The Alberta Mental Health Board (AMHB) advises that if you or someone you know requires assistance with a mental health issue, you should seek treatment immediately. If it is an emergency, go to a hospital or see a doctor or call a Crisis Line. You may also call the toll-free, 24-hour AMHB Help Line (1-877-303-2642) from anywhere in the province. If the situation is not an emergency, you should talk to a doctor or contact the nearest mental health clinic.

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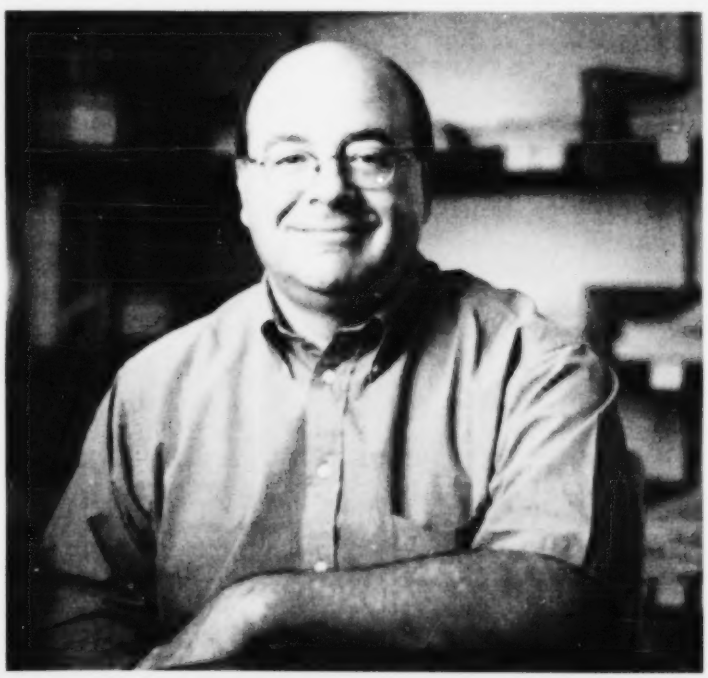
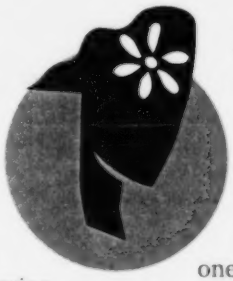
The test case for the performance-measure project is Calgary's Early Psychosis Treatment Program, which was developed by Dr. Addington to reach young people early and minimize the impact of schizophrenia on their lives. "I've chosen to look at schizophrenia because it's my technical interest. However I believe this approach can be transferred to other mental disorders. I hope it's contagious."

It's not just psychiatrists and basic scientists who do research on mental illness. A number of important questions in mental health are being addressed by epidemiologists. These scientists study the various factors influencing the occurrence, distribution, prevention, and control of disease in various populations. Just as epidemiology has helped us to understand cancer and heart disease, its techniques are also being applied to mental illness.

Psychiatric epidemiologist Dr. Stephen Newman at the University of Alberta does a wide variety of studies on the characteristics, risk factors, and outcomes of mental illness. One of his special interests is suicide and attempted suicide. "Alberta's suicide rate has been higher than the national average for the past 30 years," he says. "And on an international scale Edmonton's attempted-suicide rate ranks very high. Suicide is a major problem that should be receiving more attention."



"SUICIDE IS A MAJOR PROBLEM THAT SHOULD BE RECEIVING MORE ATTENTION."



One of Dr. Newman's recent studies tracked long-term results for approximately 500 people who had attempted suicide in the Edmonton area. Did they repeat their suicide attempt? Many did. Did they get follow-up help from mental health professionals? By three months after their suicide attempt, only one half had received any help at all and just one half of that group were treated by a psychiatrist. "The results show us that people with chronic mental health problems need care and may not be getting it," says Dr. Newman.

The study also looked at well-being. While people in the study reported that things had improved for them after their suicide attempt, their lives were still far from normal. "These people continue to live chaotic, very disturbed lives," says Dr. Newman. "One of the things we would like to do is identify risk factors for suicide and for attempted suicide, so that we could home in on those people at high risk and try to help them.

"Mental health is far more of a public health concern than most people realize. I wait for the day that mental health issues get the profile they deserve."

The University of Calgary's Dr. Scott Patten agrees. "Many mental health problems go unrecognized and untreated," he says. "We need to develop methods of surveillance that give us the same kind of epidemiological data about mental illness as we have with cancer and heart disease. Then we can use this data to help make better decisions on what to do about mental health issues."

With support from the Health Research Fund, Dr. Patten began the task of developing epidemiological methods for monitoring mental health in Alberta. The work is now past the pilot stage and continues with ongoing funding from the provincial government and the Calgary Health Region.

Data collection is part of an effective surveillance system, and a series of surveys now underway are

LEFT: DR. STEPHEN NEWMAN

"MENTAL HEALTH RESEARCH IS A HUGE OPPORTUNITY TO HELP PEOPLE."

designed to learn about well being, the prevalence of mental illness, and the impact of mental health on disability and the quality of life of Albertans. "These methods will help us keep a finger on the pulse of mental health in the province," says Dr. Patten. He notes that the system is also designed to have a consultation process with decision-makers. This would take place before, during, and after data collection and analysis, ensuring that the data is used to make informed decisions.

"Mental health research is a huge opportunity to help people," says Dr. Patten. "It's exciting because as a researcher you're not simply ironing out wrinkles, you have the potential to make big strides. You can really make a difference."

Heritage Scholar Dr. Peter Silverstone is a full professor in the departments of Psychiatry and Neuroscience at the University of Alberta. His research is supported primarily by AHFMR and the Canadian Institutes of Health Research (CIHR).

Heritage Scholar Dr. Janice Braun is a CIHR New Investigator and an assistant professor in the Department of Physiology and Biophysics at the University of Calgary. Her research is supported by an AHFMR establishment award; a CIHR operating grant; the Province of Alberta's Research Excellence Envelope; the University Research Grants Committee; the Faculty of Medicine's Endowment; the Canadian Psychiatric Research Foundation; and the Novartis Investigatorship in Schizophrenia.

Dr. Donald Addington is a full professor in the Department of Psychiatry at the University of Calgary. His research is supported by the Health Research Fund (administered by AHFMR on behalf of Alberta Health and Wellness), CIHR, and a number of industry grants.

Dr. Stephen Newman is a full professor in the Department of Psychiatry at the University of Alberta, with a cross-appointment in the Department of Public Health Sciences. He is also a Research Fellow at the Institute of Health Economics. His research is currently funded by CIHR and the Institute of Health Economics.

Dr. Scott Patten is a Heritage Population Health Investigator and an associate professor in the departments of Community Health Sciences and Psychiatry at the University of Calgary. He is also a Research Fellow at the Institute of Health Economics. The main founders of his research are CIHR and AHFMR.

Selected publications

Silverstone PH, O'Donnell T, Ulrich M, Asghar S, Hanstock CC. Dextroamphetamine increases phosphoinositol cycle activity in volunteers: an MRS study. *Human Psychopharmacology: Clinical and Experimental* 2002 Dec;17(8):425-429.

Miller LC, Swayne LA, Kay JG, Feng Z-P, Jarvis SE, Zamponi GW, Braun JEA. Molecular determinants of cysteine string protein modulation of N-type calcium channels. *Journal of Cell Science* 2003 Jul;116(14): 2967-2974.

Mintz AR, Addington J, Addington D. Insight in early psychosis: a 1-year follow-up. *Schizophrenia Research*. In press 2003.

Newman SC, Thompson AH. A population-based study of the association between pathological gambling and attempted suicide. *Suicide and Life-Threatening Behavior* 2003 Spring;33(1):80-87.

Patten SB, Lee RC. Modeling methods for facilitating decisions in pharmaceutical policy and population therapeutics. *Pharmacoepidemiology and Drug Safety* 2002 Mar;11(2):165-168.

ABOVE: DR. SCOTT PATTEN

Dealing with substance abuse

Substance abuse is a major legal, social, and health issue. The economic cost associated with alcohol in Canada in 1992 was estimated conservatively at about $7.52 billion, with 6,701 deaths attributed to its abuse. Illicit drug abuse accounted for 732 deaths and $1.37 billion in costs in that same year. "The need to do something about addictions is clear. The problem is that addictive behaviors are chronic relapsing conditions, have complex social and biological roots, and are very tough problems," says Heritage Population Health Investigator Dr. Cameron Wild. "There are no simple answers, no magic bullets."

Dr. Wild is the principal investigator of the Addiction and Mental Health Research Laboratory at the University of Alberta's Centre for Health Promotion Studies, which investigates psychosocial aspects of addiction and mental health. The term "psychosocial" refers to the psychological and social factors that influence mental health. Social influences such as peer pressure, parental support, cultural and religious background, socioeconomic status, and interpersonal relationships contribute to addictive behaviors, as do psychological factors such as attitudes, emotions, and personality. Dr. Wild's research covers a broad range of topics including studies of problem drinking, injection drug use, smoking, continuity of care in mental health service delivery, and the relationship between emotional expression and health.

A recent study looked at problem drinkers—people who do not meet clinical criteria for alcohol dependence but whose drinking puts them at risk of experiencing health and social problems. In an upcoming article in the Canadian Journal of Public Health, Dr. Wild and his colleagues demonstrate that this amounts to about 12% of Alberta adults. Because the vast majority of these problem drinkers will never seek formal treatment, the challenge was to develop an intervention that could be disseminated to the general public relatively inexpensively.

"Drinkers and smokers prefer to change on their own," explains Dr. Wild. "We wanted to take advantage of this and develop non-threatening ways to help them change their behavior before it gets worse. "Heavy drinkers often believe that their drinking is not excessive, that it's about the same as everyone else's. We designed a simple mail-out pamphlet that helps drinkers see their own alcohol use in relation to population norms. The information is aimed at correcting biased perceptions and motivating heavy drinkers to change on their own."

ABOVE: DR. CAMERON WILD

Heritage Population Health Investigator Dr. Cameron Wild is an associate professor in the Centre for Health Promotion Studies and the Department of Public Health Sciences at the University of Alberta. He is a CIHR (Canadian Institutes of Health Research) New Investigator; his research is also supported by the Social Sciences and Humanities Research Council of Canada (SSHRC).

Selected publication

Wild TC, Roberts AB, Cooper EL. Compulsory substance abuse treatment: an overview of recent findings and issues. *European Addiction Research* 2002 Apr;8(2):84-93.

Alberta geneticists find schizophrenia clue

Some of the most exciting discoveries come about by chance. Just ask Dr. Diane Cox, a leading genetics researcher at the University of Alberta. Her discovery of a gene for schizophrenia began with a trip to Scotland to gather genetic resources for her research on human chromosome 14. The work had nothing to do with schizophrenia. Rather, Dr. Cox's Ph.D. graduate student, Deepak Kamnasaran, was planning to use the material to study a genetic brain disorder.

But then they found something curious. Working with Dr. Walter Muir, a psychiatrist at the Royal Edinburgh Hospital, and Dr. Malcolm Ferguson-Smith from the Centre for Veterinary Science in Cambridge, Kamnasaran (who now has his Ph.D.) and Dr. Cox discovered a genetic flaw in one of the families for which they obtained genetic data. Both mother and daughter have a break in a large gene on chromosome 14. And both of them have schizophrenia.

"Schizophrenia is not my area of focus, but the mapping results looked so promising I felt we should carry on to find the gene," says Dr. Cox. Kamnasaran followed up, using blood samples from the two women to identify the specific gene in which the chromosome break occurs. The research team believes that the break is the major cause of the mental illness in this family.

"Of course, this is just the beginning of the story," notes Dr. Cox. "We're not saying this is the gene for schizophrenia. At this point we don't know how many individuals have this particular break. But the discovery helps other researchers because this identifies a new pathway to look for other genes that contribute to schizophrenia. The area demands further study."

Dr. Diane Cox is full professor and chair of the Department of Medical Genetics at the University of Alberta. *The research profiled in this article is supported by the March of Dimes Birth Defects Foundation. (Other studies are funded by NSERC, CIHR, the American Liver Foundation, and the Canadian Genetic Diseases Network.)*

Dr. Deepak Kamnasaran is now a post-doctoral fellow at the Hospital for Sick Children in Toronto. *While doing his Ph.D. at the University of Alberta, he received support from AHFMR and CIHR studentships.*

Selected publication

Kamnasaran D, Muir WJ, Ferguson-Smith MA, Cox DW. Disruption of the neuronal PAS3 gene in a family affected with schizophrenia. *Journal of Medical Genetics* 2003 May;40(5):325-332.

ABOVE: DR. DIANE COX

The back pain-depression link

As a clinical psychologist, Heritage Scholar Dr. Linda Carroll saw many patients suffering from both back pain and depression. "We knew there was a connection, but it hadn't been well studied," she says. When Dr. Carroll decided to pursue a research career, the link between back pain and depression was an obvious area of specialization for her.

She is the author of a recently published study showing that back pain is a strong predictor of depression. Dr. Carroll has also looked at the question of whether depression can be a cause of back pain, not only a consequence. She expects the results of this research to be published shortly. And she is currently working on a study that focuses on the course of depression during recovery from whiplash.

"The depression–back pain relationship is extremely important," says Dr. Carroll. "We know that pain treatment is less effective in people with depression.

And chronic pain patients who are also depressed tend to drop out of treatment programs at a higher rate than other patients. My goal is to tease apart the relationships so the knowledge gained can be used to improve the effectiveness of treatment. We need new approaches to breaking the cycle of pain, depression, and dysfunction."

"WE NEED NEW APPROACHES TO BREAKING THE CYCLE OF PAIN, DEPRESSION, AND DYSFUNCTION"

Heritage Scholar Dr. Linda Carroll is an associate professor in the Department of Public Health Sciences at the University of Alberta, and affiliated with the Alberta Centre for Injury Control and Research. Dr. Carroll is also a member of an international body called the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders.

Selected publication

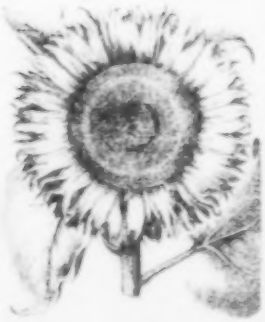
Carroll LJ, Cassidy JD, Côté P. Factors associated with the onset of an episode of depressive symptoms in the general population. *Journal of Clinical Epidemiology* 2003 Jul;56(7):651-658.

ABOVE: DR. LINDA CARROLL

Although they both work at the University of Calgary, in many ways Maurice Moloney and Tony Schryvers are worlds apart. Dr. Moloney is an expert in plant genetic engineering, while Heritage Scientist Dr. Schryvers looks for new ways to design vaccines. Normally their paths wouldn't cross at the university. However, Dr. Schryvers had an idea that brought the two scientists together.

A meeting of minds

The focus of Dr. Schryvers' work on vaccines is a system that allows bacteria to obtain iron–which is essential for their growth–from the host they are infecting. Receptors at the bacterial surface play a key role in this iron acquisition process, a fact that makes them attractive vaccine candidates. To the host's immune system, the receptors represent a target that cannot hide or disappear.



It occurred to Dr. Schryvers that oil bodies could be engineered for use as a vaccine.

One of the challenges with this type of work is finding ways to effectively deliver the vaccine–which is where Dr. Schryvers' idea came from. He had heard about Dr. Moloney's research on oil seeds (from plants like canola and sunflower) that had led to the establishment of Calgary-based biotechnology company SemBioSys Genetics Inc. In fact, one of Dr. Schryvers' former graduate students worked at SemBioSys. The company's proprietary technology allows for the production of proteins in genetically engineered oil seeds. This involves attaching proteins to oil bodies, the tiny oil "storage compartments" in the cells of oil seeds. It occurred to Dr. Schryvers that oil bodies, which are about the size of bacteria, could be engineered for use as a vaccine. He dashed off an e-mail to Dr. Moloney.

"I was pretty excited about the prospects," says Dr. Schryvers. "I saw a lot of potential. Maurice saw it too and we decided to explore the concept."

But how to fund the project? At that point, all the scientists had was an idea. For SemBioSys to be interested in supporting the work, the company (which has no experience in vaccine development) had to have some evidence that the idea would work. And the project was too far removed from Dr. Schryvers' and Dr. Moloney's main research

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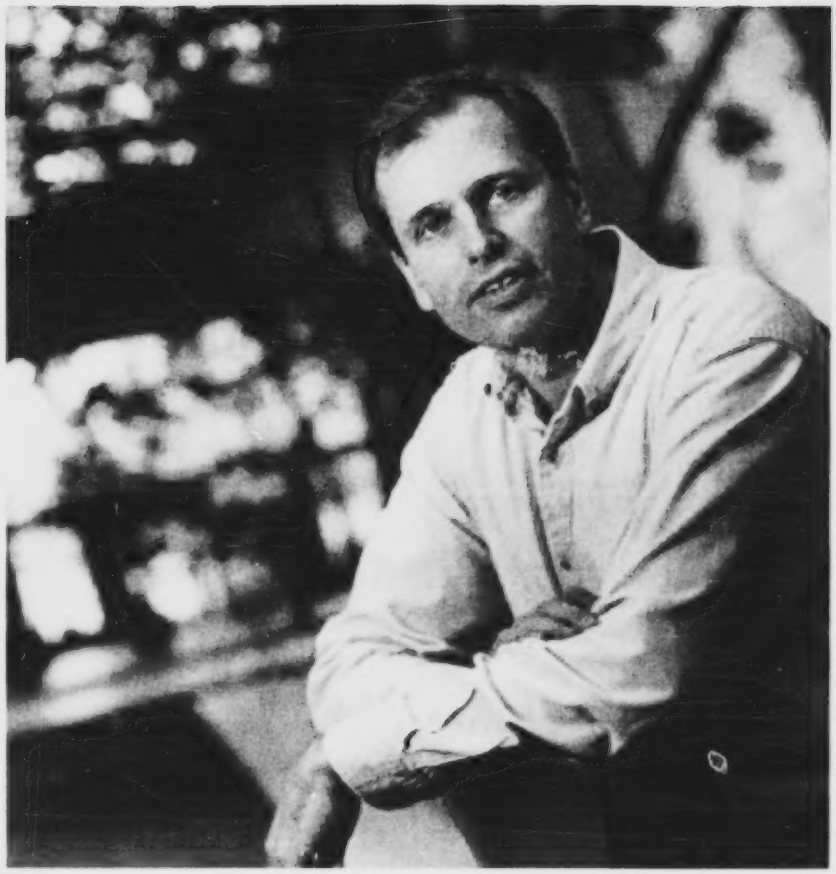
A meeting of minds

"Without the TC money, we wouldn't have been able to pursue this research."



areas to attract their traditional sources of funding. They turned to AHFMR's Technology Commercialization (TC) program, which funds projects aimed at transferring new ideas and scientific findings into successful commercial health products and processes.

"TC funding was critical to this project," says Dr. Schryvers. "As a scientist I feel I have an obligation to follow up on promising ideas that could have an impact on human health. But sometimes these projects fall in a funding gap. Without the TC money, we wouldn't have been able to pursue this research."

And pursue it they did. The team was able to show that an oil body and protein combination will induce an immune response—the essential foundation for a vaccine. The technology has been patented and licensed to SemBioSys.

Since then, SemBioSys has contacted several commercial vaccine developers. "We found out we needed further development on the technology to make it attractive for a vaccine partner," explains Dr. Harm Deckers, intellectual property manager at SemBioSys. "However, we are now in substantive negotiations with a veterinary vaccine developer. We believe that positive results in this area will assist in transferring the concept to human vaccines." SemBioSys is now building on the experimental work done at the university. Dr. Schryvers continues to be involved as a consultant.

"This is a nice Alberta technology transfer story," says Dr. Deckers. "It could be a huge story if the next steps are successful. But at this point we just don't know what the outcome will be.

"Whatever happens, I think it's important that this technology had somewhere to go beyond the university research lab. At SemBioSys we are always on the lookout for technology that can be synergistic with ours. We are definitely interested in talking to researchers. After all, SemBioSys grew out of university research. We understand the dynamics of university research, and can be an effective partner in technology transfer."

Dr. Maurice Moloney is a full professor in the Department of Biological Sciences at the University of Calgary, and chief scientific officer at SemBioSys Genetics Inc. He holds the NSERC/Dow AgroSciences Chair in Plant Biotechnology.

Heritage Scientist Dr. Tony Schryvers is a full professor in the Department of Microbiology and Infectious Diseases at the University of Calgary.

ABOVE: DR. TONY SCHRYVERS

Launching a TC career

Dr. Harm Deckers has his hands full. As intellectual property manager at SemBioSys Genetics Inc., he looks after the Calgary biotech company's rapidly expanding patent and trademark portfolios, develops commercialization strategies for products, and oversees the acquisition and out-licensing of technologies. "Obviously there's more work here than one person can handle," says Dr. Deckers. "But finding people with a strong science background and experience with commercialization is a huge challenge. There just aren't many people with this skill set."

The TC Internship program filled the bill

Enter AHFMR's Technology Commercialization Internship program. It supports training in technology commercialization and is available to individuals with an appropriate background in science or business, or both. AHFMR funds the salary of the intern and provides a training allowance. The host company gives the intern hands-on experience.

This is exactly what Kimberly Irving is getting as a TC intern at SemBioSys. With an M.Sc. in molecular biology, Ms. Irving had the scientific background Dr. Deckers required. However, apart from a fervent desire to work in commercialization, she had no actual experience in the field.

"During research for my master's degree, I was exposed to the process of technology commercialization, and I really wanted to continue in this area rather than work in the lab," says Ms. Irving. "But when I applied for jobs, no one was interested. I had the science but not the business skills."

The TC Internship program filled the bill for both Kimberly Irving and Dr. Deckers. She is gaining key business experience, and has become an important resource for the company's intellectual property department. (Ms. Irving's co-worker in the department is Joann Priestley, a former TC intern who did her internship at UTI Inc.) Since starting at SemBioSys in February 2003, Ms. Irving has been working with the company's patent portfolio—interviewing scientists, researching publications, and drafting patents.

"Kimberly has faced a steep learning curve. Her research background and strong drive to enhance her skills have served her well," says Dr. Deckers. "Yes, the company had to take the time to train her; however, it's been a very worthwhile investment."

ABOVE: JOANN PRIESTLEY (LEFT) AND KIMBERLY IRVING

researchers in the making

Avoidance and depression

NICOLE OTTENBREIT

Many of us are guilty of avoiding certain situations, decisions, or tasks. But when we find ourselves consistently shunning these things, what kind of toll does it take on our mental health? It's a link that AHFMR Student Nicole Ottenbreit plans to explore.

A P Ph.D. candidate in the University of Calgary's Department of Psychology, Nicole works under the supervision of Dr. Keith Dobson, who has conducted research on depression for over 20 years. "He saw a connection between avoidance and depression in his clinical work," says Nicole, explaining that avoidance refers to escaping or refraining from an action, person, or thing. Examples might include avoiding social relations or avoiding acting on goals.

"People who engage in high levels of avoidance miss out on the opportunity to receive the positive reinforcement they would get for completing a task or enjoying themselves in a social situation," she adds. "And we know that low levels of positive reinforcement from our environment can contribute to or maintain depression."

Since few methods of measuring avoidance existed, Nicole developed for her Master's degree a scale to determine the extent of people's avoidance in dealing with situations and problems. The scale is divided into cognitive avoidance (of thoughts) vs. behavioral avoidance (of life situations), as well as social vs. non-social avoidance. An example of cognitive non-social avoidance would be not making a decision about school or work. A behavioral social avoidance strategy would be avoiding attending a social activity.

For her Ph.D. research project, Nicole plans to examine whether various types of avoidance, as measured by the scale, are related to depression. Noting that the prevalence of depression is twice as high in women as in men, Nicole explains that for her study she will conduct interviews to find 60 women who are clinically depressed. Clinical depression is more than just feeling sad or depressed. It reflects a pattern of symptoms, occurring together for at least two weeks, that include depressed mood, loss of interest

Avoidance refers to escaping or refraining from an action, person, or thing.

in activities, eating and sleeping disturbances, negative feelings about oneself and one's future, concentration difficulties, and reduced energy.

To serve as comparison groups, Nicole will also recruit 30 women with social anxiety disorder (a disorder characterized by excessive concern about being evaluated in a social situation and resulting in social impairment) and 30 women with no current psychiatric diagnosis or history of depression. "The reason for including an anxiety group is that avoidance plays a central role in the description, diagnosis, and treatment of anxiety disorders, so it is a useful comparison group," says Nicole. "We'll look at how the levels and types of avoidance differ across the groups. The study will also allow us to determine if our scale is a good measure in a clinical sample."

Nicole is also examining the relationship between avoidance and other risk factors for depression, such as the personality characteristics of sociotropy (a tendency to place excessive value on social connection and acceptance) and autonomy (a tendency to place excessive value on achievement, control, and independence). In addition, she plans to follow up with the depressed subjects after 6 months to determine whether avoidance at an initial point in time predicts whether people are still depressed down the road.

Nicole thinks it will be helpful for future researchers to have a multidimensional scale to measure avoidance so that the nature of the relationship between avoidance and depression can be examined. "If avoidance is indeed a risk factor for the onset of depression and for maintaining the condition in those who are already depressed, there will be implications for the prevention and treatment of depression."

AHFMR Student Nicole Ottenbreit is a Ph.D. candidate in the University of Calgary's Department of Psychology in the Faculty of Social Sciences. She also receives funding from the Social Sciences and Humanities Research Council (SSHRC).

Selected publications

Ottenbreit ND, Dobson KS. Avoidance and depression: the construction of the cognitive-behavioral avoidance scale. *Behavior Research and Therapy.* In press 2003.

Dobson KS, Ottenbreit ND. Relapse prevention in clinical depression. In: Dozois DJA, Dobson KS, editors. *The Prevention of Anxiety and Depression: Theory, Research and Practice. Washington* (DC): American Psychological Association Press. In press 2003.

reader resources

The healthy community
University of Calgary
Centre for Health and
Policy Studies
http://www.chaps.
ucalgary.ca

Junk DNA
Dr. Steven Zimmerly lab
web site
http://www.fp.ucalgary.ca/
group2introns/

AIDS, infections and the immune system
Canadian Foundation
for AIDS Research
http://www.canfar.com

The growth of breast cancer
Dr. Zhixiang Wang's
web site
http://www.ualberta.ca/
CELLBIOLOGY/wang.html

Proteins in 3-D
Alberta Synchrotron
Institute
http://alpha.asi.ualberta.com

Canadian Light Source Inc.
http://www.lightsource.ca

Canadian Poxvirus website
http://athena.bioc.uvic.ca/
genomes

Mental health, mental help
Canadian Mental Health
Association
http://www.cmha.ca

Alberta Mental Health
Board Help Line
1-877-303-2642 (toll free,
24 hours a day)

Dealing with substance abuse
University of Alberta
Addiction and Mental Health
Research Lab
http://www.chps.ualberta.
ca/research/addiction_
mental_health_research_
lab.htm

A meeting of minds
SemBioSys Genetics Inc.
http://www.sembiosys.com

Researchers in the making
Gotlib IH, Hammen CL.
Handbook of depression.
New York: Guilford Press;
2002.

Ingram RE, Miranda J,
Segal ZV. Cognitive vulnerability to depression. New
York: Guilford Press; 1998.

AHFMR Media Fellows 2003

Lisa Lemieux
Medical student, University of Alberta

During my undergraduate degree, I knew I wanted to go into medicine, to learn all that I could about the human body and how we work. But I knew just as assuredly that I wanted to know why we work, what really makes us tick–and I wanted to write about that. So I was naturally drawn to the AHFMR Media Fellowship program at CBC Radio Edmonton.

My first week at the station in late May was a blur of mad cow disease research. One day, I found myself at a press conference announcement that an Alberta bird had tested positive for West Nile virus. That was one of the most exciting times of my internship–I was able to call in a story that aired within about five minutes of us recording it. The story led an Edmonton newscast that afternoon, and was also picked up in Calgary.

My time at CBC Radio has given me an amazing amount of respect for the work reporters do. Deadlines to a university student come in the range of weeks. Deadlines for reporters are a matter of hours or minutes. *It's 10 a.m., and I am calling Capital Health for a quote for the noon newscast. It's 11:00 ... still looking. 11:30, I'm finally talking to someone. 11:45, pulling a clip, finishing the intro, then a line to conclude. 11:50 a.m. and my story is in for editing, just under the wire.*

Now that it's fall, I'm back in medical school, continuing to learn how to ask the important questions and explain difficult medical topics, armed with all I have learned during my time as a reporter.

Erin Norland
M.Sc. student University of Calgary

During the course of my graduate degree I've met many wonderful researchers who do such important work, yet no one outside of the university knows it exists. It has always been a source of frustration for me. A scientist's job is to help people, but we don't seem to have the ability to tell people *how* we're helping them. Being the recipient of the AHFMR's Media Fellowship award gave me the exciting opportunity to be the middle person who understands the science, and also understands how to tell people about it.

This summer at CBC Radio Calgary I had the opportunity to speak with a woman who was taking tapeworm eggs to combat her Crohn's disease, a couple whose twin boys were conceived by in vitro fertilization, and a man who was going through the painful process of becoming a woman. The human side of science and medicine is really important to the media and now it is to me too. What has really surprised me is that working at the CBC has made me a better scientist. I know now how to clearly communicate my research to people outside of my field, how to engage them, and how to remember the big picture. I believe it is the responsibility of the media and the scientific/medical community to work together, to educate the public about the important work being done in our very own backyard. Our interests are intimately intertwined, and without this Fellowship I don't think I would have ever fully understood that concept.

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Lisa Lemieux
Medical student, University of Alberta

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